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GOOD WORKMAN PRACTICES FOR POWER DISTRIBUTION LINE CONNECTIONS

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
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degree of Master of Science



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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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CONTENTS

Declaration.....	i
Contents	ii
Abstract.....	v
Acknowledgement	vi
List of figures.....	viii
List of tables.....	x
Acronyms.....	xi
1. Introduction.....	1
1.1. Fusion connections	2
1.1.1. Soldering.....	2
1.1.2. Brazing.....	2
1.1.3. Welding.....	2
1.2. Pressure connections.....	3
1.2.1. Clamp-type connectors.....	3
1.2.2. Compression-type connectors.....	3
1.2.3. Powder-actuated connectors.....	3
2. Theory of connecting materials	4
2.1 Area of contact.....	4
3. Material properties, effective connection methods and procedures	7
3.1 Aluminum.....	8
3.1.1 Aluminum oxide.....	9
3.1.2 Galvanic action on aluminium.....	10
3.2 Copper.....	10
3.2.1 Copper oxide	10
3.3 Steel	10
3.4 Expansion of metals.....	11
3.5 Corrosion of connections in power circuits.....	11
3.5.1 Galvanic action.....	12
3.5.2 Crevice corrosion.....	13
3.6 Corrosion prevention techniques	14
3.6.1 Applying joint compounds	15

3.6.2	Plating of contact surfaces.....	15
3.7	Anodizing of aluminum.....	16
3.8	Selection of connectors.....	16
3.8.1	Aluminium to aluminium connections.....	17
3.8.2	Copper to copper connection.....	17
3.8.3	Aluminum to copper connections.....	17
3.8.3.1	Massive anode principle.....	17
3.8.4	Bolted connections.....	18
4.	Standards.....	20
4.1	Compression connectors.....	20
4.2	Mechanical connectors.....	24
4.2.1	Bolting of connections.....	25
4.3	Compression tools.....	26
4.3.1	Hand tools.....	27
4.3.2	Pneumatic tools.....	28
4.3.3	Hydraulic compression tools with integral pumps.....	28
4.3.4	Hydraulic compression heads.....	28
4.3.5	Hydraulic pumps.....	29
4.3.6	Preparation and testing of compression specimens.....	29
4.3.7	Certificate.....	29
5.	Unsuccessful workman practices in electrical connections.....	30
5.1	Case 1: feeder pillar.....	30
5.2	Case 2: transformer LV connection.....	31
5.3	Case 3: substation LV fusing.....	33
5.4	Case 4: transformer tail wire connection to LV feeders.....	35
5.5	Case 5: poor workmanship on connectors.....	36
6.	Connectors for power distribution system.....	38
6.1	Connectors for jumper connections of bare conductors.....	40
6.2	Tension joints for bare conductors.....	44
6.2.1	Sleeves use in CEB for tension joints of Fly conductor.....	45
6.2.2	Sleeves use in CEB for tension joints of Weasel conductor.....	46
6.2.3	Sleeves use in CEB for tension joints of Raccoon conductor.....	46
6.2.4	Sleeves use in CEB for tension joints of Elm conductor.....	47
6.2.5	Sleeves use in CEB for tension joints of Lynx conductor.....	48

6.3	Connections for arial bundled conductors	49
6.4	Expulsion fuse cutout terminal connection.....	53
6.5	Substation LV feeder connection.....	54
6.6	Service wire joints.....	54
6.7	Energy meter terminal connections.....	55
6.8	Exothermic welding	56
7.	Die selection	59
7.1	Theory of compression connectors	65
8.	Thermal imaging.....	71
8.1	Scheduling of thermal imaging surveys.....	75
9.	Conclusion	76
	References.....	78



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Abstract

Defective electrical connections in power distribution systems will result many circuit and equipment failures. Power distribution loss reduction and power system reliability improvement are becoming very important vicinities to be investigated. There are several methods available for power distribution loss reduction. Energy losses by connectors installed in power distribution network is one of the highly concerned. Quality of power line connections directly affects the power system reliability. Compression connectors or compression joints are a popular type of connectors used for joining or terminating conductors in power distribution network.

Identification of good workman practices for power distribution line connections is important to make the power system more reliable. Standardization of process of power line connector installation and proper die selection technique for compression connectors are essential for power system reliability improvements. This study is an attempt to identify good workman practices required for making perfect power distribution line connections. This will be a guide in the assembly and preventive maintenance of efficient electrical connections for power distribution circuits. An efficient connection shows minimum resistance, both at initial assembly and in the long run.

Data and experience gained through usage on power line connectors by Ceylon Electricity Board (CEB) is the basis of this study. The results of tests carried out on power distribution line connections are incorporated in the recommendations. Properties of conductor metals and metal oxides are discussed. These illustrate requirements of recommended methods of making connections. Requirement for the proper selection of connectors, the proper preparation of conductors, and the proper application of fusion, compression, and bolted connectors are identified. Standards available on power line connectors are discussed to illustrate effective workman practices. Photographs of bad workman practices are included with explanations.

Mathematical formula is developed for calculating correct die size for compression connectors. Amount of material available in connector and conductor are compared with area inside the suggested die for determining the correct die size. Performance identification of any type of connector installed in a power line is carried out by thermal imaging. Thermal images taken from few installed connectors are included and a procedure for assessing connector performance is suggested.

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List of Figures

Figure	Page
Figure 1.1: Pressure connectors	3
Figure 2.1: Extruded metal surface (approx. 1mm x 0.7mm).....	4
Figure 2.2: Sectional view of two metal surfaces placed together.....	5
Figure 2.3: The view of aluminum conductor surface.....	5
Figure 2.4: Detailed view of two surfaces at rest.....	6
Figure 3.1: Formation of aluminium oxide.....	9
Figure 3.2: Oxide formed between contact surfaces.....	9
Figure 3.3: Use of copper compression connector on Al conductor.....	11
Figure 3.4: Galvanic action.....	12
Figure 3.5: Crevice corrosion.....	14
Figure 3.6: Apply joint compounds and plating of cathode.....	14
Figure 3.7: Anode should not be plated	16
Figure 3.8: Prevention from galvanic corrosion by similar metals.....	17
Figure 3.9: Massive anode principle	18
Figure 4.1: Examples of correct and incorrect bolted terminations.....	22
Figure 4.2: Examples of common compression faults.....	23
Figure 4.3: Examples of correct and incorrect compression preparations.....	24
Figure 5.1: Bad workman practice-case 1.....	30
Figure 5.2: Bad workman practice-case 2.....	31
Figure 5.3: Bad workman practice-case 2.....	32
Figure 5.4: Bad workman practice-case 2.....	33
Figure 5.5: Bad workman practice-case 3.....	34
Figure 5.6: Bad workman practice-case 3.....	34
Figure 5.7: Bad workman practice-case 4.....	36

Figure 5.8: Poor workmanship on connectors	37
Figure 6.1: H type connector.....	40
Figure 6.2: 5T mechanical crimping tool with inbuilt ‘O’ and ‘D’ groves.....	43
Figure 6.3: 12T hydraulic crimping tool.....	43
Figure 6.4: Dies for crimping H type connectors -12T hydraulic tool	43
Figure 6.5: A compression connector	44
Figure 6.6: Advantages of ABC.....	49
Figure 6.7: Cross section of LV Aerial Bundled Conductor.....	50
Figure 6.8: Sleeves for bundle conductor with color code	51
Figure 6.9: Installation of lugs for phase conductor of ABC.....	51
Figure 6.10: Compression of a sleeve for ABC	52
Figure 6.11: 5T hydraulic crimping tool with duel die E 173 & E140	52
Figure 6.12: Expulsion fuse cutout	53
Figure 6.13: Expulsion fuse cutout with bimetallic connector	53
Figure 6.14: Repair of service wire.....	55
Figure 6.15: Accessories required for making efficient exothermic welding.....	57
Figure 6.16: Procedure of making an exothermic welding.....	58
Figure 7.1: Circumferential dies and hexagonal dies.....	59
Figure 7.2: Hexagonal die.....	59
Figure 7.3: Cross sectional area of a connector	60
Figure 7.4: Total cross sectional area of the connector and conductor.....	61
Figure 7.5: Area matching of the connector, conductor and the die.....	62
Figure 7.6: Sectional view of sector shape conductor and connector.....	64
Figure 7.7: Pre rounding dies.....	64
Figure 7.8: Cable after compression with pre rounding dies	65
Figure 7.9: Stress-strain diagram for a typical structural steel in tension.....	65
Figure 7.10: Stress-strain diagrams for ductile and brittle materials	66

Figure 7.11: Stress strain curve for aluminum	67
Figure 7.12: Stress strain curve in compression	67
Figure 7.13: Crystalline structure of a metal.....	68
Figure 8.1: Thermal image -case 1: PG clamp in jumper connections.....	72
Figure 8.2: Thermal image -case 2: jumper connection.....	73
Figure 8.3: Thermal image -case 2: jumper connection.....	74
Figure 8.4: Thermal image -case 3: LV fusing of distribution transformer.....	74
Figure 8.5: Thermal image -case 4: DDLO connection.....	75



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List of Tables

Table	page
Table 3.1: Properties of material	8
Table 3.2: Recommended materials for bolted connections	19
Table 4.1: Recommended torque wrench settings for aluminium and copper terminations (Section 6.2 of BS 7609:1992)	26
Table 6.1: Conductors used for MV and LV power distribution in CEB.....	38
Table 6.2: AWG conductor sizes	39
Table 6.4: Different types of H type connectors use in CEB (figures)	41
Table 6.4: Range of conductor sizes for different H type connectors.....	42
Table 6.5: Sleeves used in CEB for tension joints of Fly conductor.....	45
Table 6.6: Sleeves used in CEB for tension joints of Fly conductor (figures).....	45
Table 6.7: Sleeves used in CEB for tension joints of Weasel conductor	46
Table 6.8: Sleeves used in CEB for tension joints of Weasel conductor (figures)	46
Table 6.9: Sleeves used in CEB for tension joints of Raccoon conductor	47
Table 6.10: Sleeves used in CEB for tension joints of Raccoon conductor (figures) .	47
Table 6.11: Sleeves used in CEB for tension joints of Elm conductor	48
Table 6.12: Sleeves used in CEB for tension joints of Elm conductor (figures).....	48
Table 6.13: Sleeves used in CEB for tension joints of Lynx conductor.....	48
Table 6.14: Sleeves used in CEB for tension joints of Lynx conductor (figures).....	49
Table 6.15: E clamps for substation LV feeder connection	54
Table 6.16: Bimetallic pin connector for energy meter terminal	55
Table 6.17: Dies for compression bimetallic Pin connector for energy meter terminal	56
Table 7.1: Die selection table	63
Table 7.2: Die width calculation	70

Acronyms

AAAC-All Aluminium Alloy Conductor

AAC- All Aluminium Conductor

ABC-Arial Bundled Conductor

ACSR-Aluminium Conductor Steel Reinforced

AGM-Additional General Manager

AWG-American Wire Gauge

CCSR-Copper Cable Steel Reinforced

CE-Chief Engineer

CEB-Ceylon Electricity Board

CM-Circular Mill

DDLO switch-Drop Down Lift Off Switch

DGM-Deputy General Manager

EE-Electrical Engineer

FSD-Fuse Switch Disconnect

HRC Fuse- High Rupturing Capacity Fuse

LCD-Liquid Cristal Display

LV- Low Voltage

MCCB-Molded Case Circuit Breaker

MV- Medium Voltage

PG Clamp-Parallel Grove Clamp

SWG-Standard Wire Gauge



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